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August 9, 2021

American Zinc Products LLC
Attention: Mr. Timothy R. Basilone
Vice President, Environmental Affairs
484 Hicks Grove Road
Mooresboro, North Carolina 28114

Re: Sampling and Analysis Plan — Process Ponds
American Zinc Products
484 Hicks Grove Road
Mooresboro, North Carolina 28114

BACKGROUND

The American Zinc Products facility is approximately 196 acres in size and is located at 484 Hicks Grove Road in Mooresboro, North Carolina. A Site Layout Map has been included as Figure 1A. Primary operations at American Zinc Products (AZP), consist of zinc metal production via solvent extraction and electrowinning.

During the week of July 25, 2021, the plant initiated a program to replace the liners within a process pond called the Raffinate Pond which is located on the west side of the facility. AZP engaged EnSafe Inc. to observe the surface beneath the liner system and conduct sampling as warranted to determine whether there had been a release from the pond. Upon removal of the liner system, EnSafe Inc. personnel installed shallow, hand-augured borings at two locations. Soil samples from these borings, conducted at intervals from 6 inches to 3 feet, were submitted to an independent laboratory for analysis; however, to provide more rapid data, split samples were also submitted to the in-plant QA/QC laboratory for analysis. Results of the in-plant analysis showed soils with low pH. Further, cadmium, lead, and zinc, which are constituents of the Raffinate process were also detected.

It could not be determined whether the release was the result of a recent failure of the liner system or from historical operations. However, AZP personnel provided release notification to the National Response Center, United States Environmental Protection Agency (U.S. EPA) and to the North Carolina Department of Environmental Quality (NCDEQ) on Thursday, July 29, 2021.

The facility initiated the development of a response plan immediately. This work plan is being submitted as part of that response plan. The Raffinate Pond which was the subject of testing is one of three process ponds that are generally co-located on the western side of the plant. AZP has determined that the other two process ponds should be included in the following response plan as they are similarly designed and operated.

Physiographic and Topographic Setting

The Site is located within the Southern Outer Piedmont physiographic province of North Carolina, which is characterized by low rounded hills and ridges, and low to moderate gradient streams. Rainfall amounts in this region vary from 40 to 50 inches per year. The predominant rock type in the vicinity of the Site consists of Cambrian to Late Proterozoic age schist, mica schist, and biotite gneiss. Soil types consist primarily of fine, kaolinitic, thermic Typic Kanhapludults (Cecil, Appling, and/or Madison series). Soil pH levels associated with the Cecil, Appling, and Madison series range from moderately acidic to very strongly acidic (Omernik & Griffith 2008). Elevations at the Site range from approximately 880 feet above mean sea level (amsl) along the eastern property boundary, to approximately 680 feet amsl near the northern property boundary (USGS 2014).

Pre-Construction Geotechnical Evaluation

Geotechnical investigations were performed at the Site in 2011 and 2012, prior to the construction of the active facility. Results of the investigations were presented in the *Subsurface Exploration*, and *Subsurface Exploration — Addendum 1* reports submitted by S&ME, Inc. in July, and December 2011, respectively. A subsequent geotechnical investigation was performed in 2012 along the railyard at the facility, as reported in the *Geotechnical Exploration Report — Horsehead Facility — Retaining Wall at Railyard* (S&ME 2012). Four geotechnical borings were completed in the vicinity of the west ponds. These borings were identified as follows, in the abovementioned reports: B-2, B-4, B-6, and B-16. A map depicting the location of historical geotechnical borings overlaid on the current site configuration has been included as Figure 2.

Boring logs for geotechnical borings completed in the vicinity of the west ponds show that partially weathered rock, which was encountered in three of the four of the borings in the area, was reported at depths ranging from 0 to 28 feet below the surface.

Constituents of Potential Concern

The constituents of potential concern (COPCs) associated with the Raffinate solution consist primarily of the following: sulfuric acid, cadmium, chromium [total], lead, and zinc.

Initial Investigative Measures

On July 28, 2021, two hand auger locations were advanced to a depth of 2.92 feet in HA1 and 1.75 feet at location HA2. Hand auger locations from the initial investigative measures can be found as Figure 3. It was noted that immediately beneath the lower liner system was a layer of sand/gravel ranging from 0.8 foot to 2.0 feet thick. Below the sand/gravel layer was a red brown clay that contained traces of sand and mica along with frequent gravel sized rocks. Liquid was encountered within the hand auger boring at HA1 around 15-inches below the surface. The analysis of samples by the onsite laboratory was completed on July 29, 2021 and indicated impacts to the soil and water below the north side of the Raffinate Pond; however, it does not appear that the water sampled is true groundwater; it is more likely to be interflow stored in the sand/gravel layer.

Mitigative Measures Implemented

Following confirmation of the Raffinate Pond release, AZP implemented the following response actions:

- Installed a new double layer liner system
- All connections of the liner to the pump well were sealed
- Began development of an alternative process plan to enable access to the process ponds for investigation and remediation, if required.
- Conducted a surface water survey downgradient of the ponds and collected samples in two locations in the nearest ravine to the process pond area.

Process Modification to Accommodate Response Plan

As described below, AZP has temporarily converted the Raffinate Pond (FE-211) and Depleted Solution Pond (FE-212) to storage tanks with the liner system serving as secondary containment in order to provide access to the ponds for soil assessment.

This interim configuration consists of a fiberglass reinforced plastic (FRP) storage and pump tanks, with a high-density polyethylene (HDPE) piping connection between the two tanks. The proposed modification from the original (as-built) configuration to the proposed interim configuration is shown in Figure 1B.

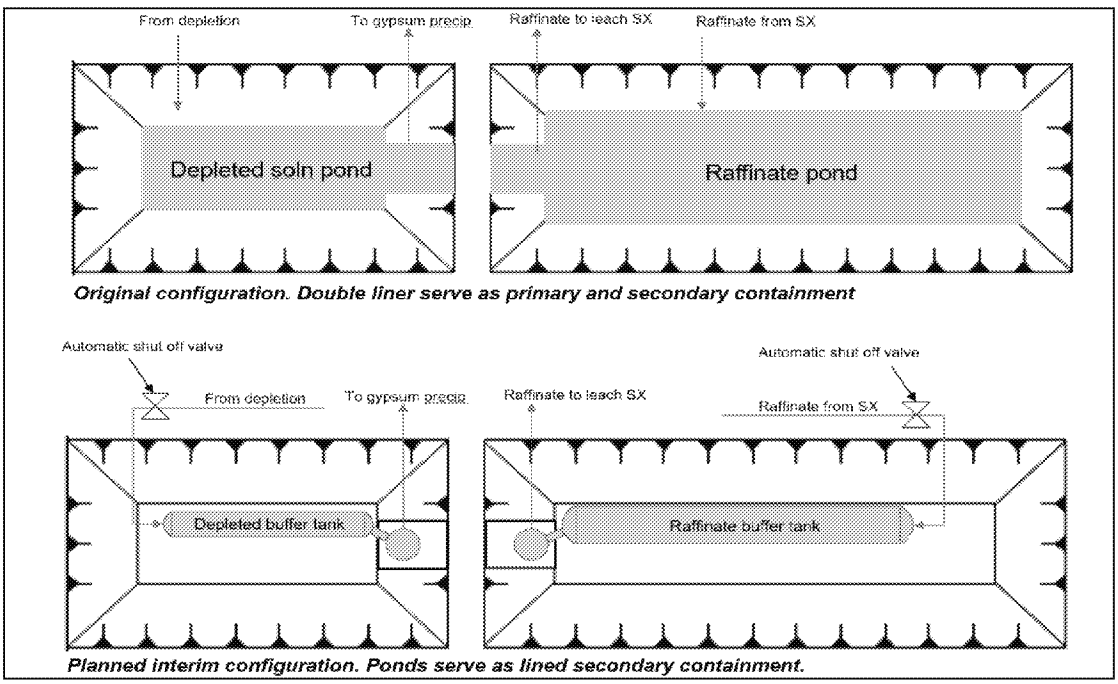

Figure 1B. Original configuration (top) and proposed interim configuration (bottom).

Key features of the proposed interim configuration for the two ponds are as follows:

- Process solution will flow under gravity from the SX circuit, directly into the horizontal buffer tank, which is connected to a vertical pump tank, placed inside the existing pump wet well. The solution will be pumped from the vertical pump tank to the next process stage.

- The pump speed will be controlled to maintain the level in the tanks at a constant value.

- An automatic shut off valve will also be installed in the pipe feeding the buffer tank, to limit the risk of overflowing the tank.

- In this configuration, the lined ponds will serve only as secondary containments, receiving rainwater, falling on the footprint of the pond. Any liquid in the pond will be pumped back into the tanks, or to the metals removal circuit, which is common practice with all secondary containments onsite.

- The system will provide good access for visual inspection of the integrity of the tanks, piping connection and pond liner, eliminating the reliance on tell-tale pipes.

Preliminary Conceptual Site Model Summary

Based on analysis of available information summarized above and from the initial site investigation, it appears that the primary pathway for liquid migration beneath pond liner exists within the underlying sand/gravel layer. This unconsolidated sand/gravel layer, which underlies the footprint of the Raffinate Pond and is assumed to be under the other ponds, is the likely geologic unit providing storage for any released liquids from the ponds.

Other pathways into the subsurface have not yet been identified.

Preliminary Summary of Environmental Receptors

The Conceptual Site Model Preliminary analysis of environmental receptors, should a release have occurred, include release to interflow and/or groundwater, release to offsite drainage in intermittent drainage regimes, potential exposure to biota through surface water and sediment, and potential human dermal and ingestion exposure through surface water and groundwater. Each of these pathways will be evaluated as data is available as to whether the pathways are complete and further evaluation is warranted.

The potential for exposure to humans through the groundwater pathway is being actively researched: Research conducted for the Initial Site Review (ISR) report includes an environmental database search, which identified only one well proximal to the Site. This well is reportedly a public water supply well located near the southwest corner of the parking area of the primary administrative building and has a designation as NC0181485. According to the NCDEQ, this well was constructed in 1977 and permitted for Hicks Grove Methodist Church to serve less than 101 people; the well is listed as closed. Currently, all water used for potable or production purposes by AZP is obtained from the town of Forest City, and not from onsite wells. Interviews with Site personnel during EnSafe's February 2020 Site visit indicate there may be one private well located in the general site area, but details of its location, use (likely lawn irrigation as city water is readily available), well depth, and or well construction were not known. EnSafe has requested well records for public and private wells in the area from NCDEQ and the Rutherford County Health Department but has not received a response.

DATA OBJECTIVES

The principal source of potential concern, which is the subject of this investigation, includes the presence of free liquid migrating through the surrounding strata and into surface water features. The primary data gathering objective is to determine if the Raffinate has impacted the area surrounding the ponds via groundwater or interflow and consequently to surface water/sediment. This Sampling Plan precedes a broader investigation to be completed under the RCRA 3013 Order following the U.S. EPA's review of the ISR. In addition to gathering the information intended to satisfy the questions above, additional information as to the subsurface layers including the compacted fill unit and the elevation of the groundwater of the nearby area will be gathered.

The purpose for collecting soil information is to determine the presence of potential residual metals concentrations and the vertical extent of elevated concentrations. Furthermore, soil sample information will be used to determine if potential metals may have entered the uppermost water bearing zone, which may be intermittent.

FIELD SAMPLING AND ANALYSIS

Field activities and data validation will be performed in general conformance with United States Environmental Protection Agency Region 4, Science and Ecosystem Support Division Field Branches Quality System, and Technical Procedures available at http://www.epa.gov/region4/sesd/fbqstp/index.html. Additionally, field sampling will be performed in accordance with a site-specific Health and Safety Plan to ensure that onsite EnSafe employees are properly trained in accordance with Occupational Safety and Health Administration 29 CFR 1910.120. The Health and Safety Plan will include operating procedures to address site-specific hazards and will make recommendations on appropriate personal protective equipment and associated action levels.

Field activities will be performed in a phased approach, in order to adequately assess impacts to the environment.

Phase 1A — Sub-liner Hand Auger Sampling

In order to assess the subsurface soils below the Depleted Pond, southern end of the Raffinate Pond, and the Maintenance Pond hand auger borings will be advanced to an estimated depth of 3 feet into soil or refusal, whichever is shallowest. Previous investigations in the northern end of the Raffinate Pond revealed a sand/gravel layer just below the pond liners. This sand layer will be removed via a two-person gas powered auger prior to commencement of the hand auger sampling. If needed temporary polyvinyl chloride (PVC) casing will be installed to prevent hole collapse. Sample intervals for the hand auger sampling will be 0.0 to 0.5 feet and 2.5 to 3.0 feet into the soil underlying the sand/gravel layer. One location from each pond will be advanced until refusal or hand augering becomes impractical. Proposed hand auger locations can be found in Figure 4.

Sampling of the Depleted Solutions Pond and the Raffinate Pond are planned for week of August 9, 2021. Sampling of the Maintenance Pond will be implemented after the plant has drained the pond which may be the following week.

Phase 1B — Subsurface Soil and Groundwater Investigation

Near Pond Borings

Soil borings will be advanced via direct push technology to refusal which is expected at depths from approximately 10 to 60 feet below ground surface at 11 locations near the operating Raffinate, Depleted, Maintenance, and Storm Water Ponds. Soil boring locations near the pond will be placed as to assist in determination the vertical and horizontal extent of contamination (if present) and in areas accessible by a drill rig. At least five of these soil borings will be converted into 2-inch monitoring wells for groundwater sampling.

Near pond soil boring sampling will consist of screening continuously collected soil samples with a hand-held XRF machine to identify potential sampling intervals within the soil. If this becomes impractical or the samples are moist, sample intervals may be submitted to the onsite laboratory for screening analysis to determine which intervals are submitted to the third-party offsite laboratory.

Upgradient Groundwater Wells

Two groundwater monitoring wells will be installed to the southeast and east of the pond area. Wells will be installed to cross the vadose zone and will provide information on the site wide groundwater elevations.

Proposed soil boring and monitoring well locations can be found in Figure 5.

Methodology: Soil sample intervals will be composited in plastic bags and placed in an appropriate container. If encountered, groundwater samples will be collected via a peristaltic pump and Teflon tubing using low-flow techniques. Sample water will be placed into the appropriate containers and will be unfiltered and acidified (with several drops of ultrapure nitric acid).

Monitoring wells will be constructed of 2-inch diameter PVC casing coupled to 10 feet of 0.01-inch slotted PVC casing. The annular space around the slotted casing and 2 feet above the slotted casing will be filled with 20/30 silica sand, topped with a 2-foot bentonite seal to 1-foot below the ground surface. Neat cement grout will not be used as to reduce the likelihood of effecting the pH of the water within the well. The wells will be completed with a 3-foot by 3-foot square concrete pads and stick up well casings or a 2-foot by 2-foot square concrete pad with flush mount surface casing, whichever is practical for the well location. Each stickup well will contain at least three protective bollards painted safety yellow.

Lab Analysis: Soil will be analyzed for the 8 RCRA metals and Zinc using U.S. EPA Method 6020 along with pH using method U.S. EPA Method 9045D. Groundwater will also be analyzed for the 8 RCRA metals and Zinc however field screening of groundwater at each location will be performed using a multi-parameter water quality meter to measure pH and specific conductance. Other parameters such as temperature, oxidation-reduction potential, and dissolved oxygen will also be collected during groundwater sampling.

QA/QC: Sample duplicates will be collected at a frequency of 1:20.

Contingencies: Soil sampling will cease once groundwater or interflow is encountered to prevent possible contamination of the underlying lithology.

Sampling Frequency: Groundwater sampling will be conducted quarterly to determine seasonal variations in the underlying aquifer. Groundwater would be sampled quarterly for the first year, at which time the data will be evaluated to determine if more or less frequency is needed

Boring Abandonment

Upon completion of sampling, all boreholes will be abandoned using a bentonite slurry, installed via tremie pipe, to the native soil surface below the gravel layer, in accordance with North Carolina Administrative Code, Title 15A, Subchapter 2C, Section .0113 (NCDENR 2009). The annular space in the PVC casing will be filled with high strength concrete to maintain the integrity of the surrounding gravel layer, and ground surface will be restored to its original form (to the extent feasible).

Phase 2 — Surface Sediment and Water Sampling

The approach will include an initial recon of the full traces of Ravines 4, 5, and 6; sample locations will be flagged and revisited to collect samples as part of the sampling activities. The planned approach is a systematic evaluation of surface water and sediment in the Ravine 4; and establishment of conditions in unimpacted Ravines 5 and 6. This systematic approach will consist of sequential sample collection beginning at lowest end of Ravines 4 and 5 and progressively moving upstream to avoid disturbance to surface water and sediment in each channel. Ravine 6 will be sampled prior to the confluence with Ravine 5. In the case of Ravine 4, sequential sampling will begin at the discharge point area at Broad River and continue up the channel until it reaches the headwall at the head of the ravine. Proposed sample locations can be found in Figure 6.

Activity: Sampling activities will consist of collection of nine paired surface water/sediment locations along the central trace of Ravine 4, beginning at the discharge point to Broad River, and continuing to the ravine headwall, two along the central trace of Ravine 5, and one along the central trace of Ravine 6 prior to the confluence with Ravine 5.

Methodology: Surface water samples will be collected as **unfiltered acidified** (preserved with several drops of ultrapure nitric acid) by submerging the sample container in pooled water. The surface water sample will be collected first to minimize turbidity in the sample. Sediment samples will be collected from pool bottoms using a stainless-steel scoop and placed in an appropriate container.

Lab Analysis: Surface water and sediment samples will be analyzed for RCRA Metals + Zinc. Field screening of surface water at each location will be performed using a multi-parameter (temperature, pH, specific conductivity, oxidation-reduction potential, and dissolved oxygen) water quality meter.

QA/QC: Sample duplicates will be collected at a frequency of 1:10.

Contingencies: In the event the presence of surface water is determined to be truly intermittent, sampling will be preferentially scheduled following a wet weather event. Ravine 1 typically has a perennial stream flow — this will used as a gauge to make a decision that the other ravines may be flowing. A rain gauge will be will also be installed onsite to determine site-specific rainfall amounts.

Seasonal variation: Sampling will be conducted during a dry season and a wet season, beginning immediately as summer is considered a wet season.

Additional: The chemical signature of the process ponds on the northwest side of the plant is known; however, the bulk chemistry and leachability of indigenous residuum and weathered bedrock is not. If reasonable exposures of each are found during recon of Ravines 5 and 6,

samples will be collected of each media and submitted for bulk chemistry analysis, and Synthetic Precipitation Leaching Procedures to quantify leachability.

Global Positioning System

To the extent feasible, sample locations will be recorded via a handheld global positioning system instrument. Such coordinates will be used to produce site maps and summary figures.

Investigation Derived Waste

Potential investigation derived wastes (IDW) include decontamination water, soil cuttings, and foundation debris. IDW will be placed in 55-gallon steel drums and temporarily staged at a designated location onsite. Following receipt of laboratory samples collected during the investigation, IDW will be transported and disposed of at a licensed disposal facility.

Data Review

Following receipt of analytical data, EnSafe will prepare a brief letter report to summarize field activities, present analytical data, and to summarize findings of the investigation. The letter report will include data summary tables and figures displaying sample locations. Analytical data associated with soil samples will be screened against site-specific background values, as determined during previous field investigations performed at the Site in 2015, and as reported in EnSafe's *Investigation Summary Report*, dated July 2015, along with the NCDEQ Preliminary Soil Remediation Goals. Background for surface water and sediment will be determined by the sample results from Ravines 5 and 6.

COMPREHENSIVE DATA EVALUATION

Following completion of the investigation, EnSafe will update the ISR report and will develop an investigation summary report, which will include summary tables, figures, laboratory reports, etc., and will present a summary of findings.

REFERENCES

EnSafe Inc. *Initial Site Review Report*. 5724 Summer Trees Drive, Memphis, Tennessee. June 2020.

— *Investigation Summary Report.* 313 Wingo Way, Mount Pleasant, South Carolina. July 2015.

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Omernik, J., & Griffith, G. *Ecoregions of North Carolina and South Carolina* (EPA). 2008. Retrieved from http://www.eoearth.org/view/article/152148

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— *Geotechnical Exploration Report, Horsehead Facility — Retaining Wall at Railyard.* 301 Zima Park Drive, Spartanburg, South Carolina. July 2012.

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Respectfully submitted,

EnSafe Inc.

By: Phillip G. Coop, CHMM
Senior Project Manager

Attachments:

Figures

Figure 1A — Site Layout Map
Figure 1B — Interim Configuration for Raffinate and Depleted Solutions Ponds
Figure 2 — Historical Geotechnical Boring Location Map
Figure 3 — Initial Investigation Hand Auger Location Map
Figure 4 — Proposed Sub-liner Hand Auger Sampling Location Map
Figure 5 — Proposed Soil Boring and Monitoring Well Location Map
Figure 6 — Proposed Surface Sediment and Water Sampling Location Map

Tables

Table 1 — Background Soil Sample Summary

Attachment
Figures

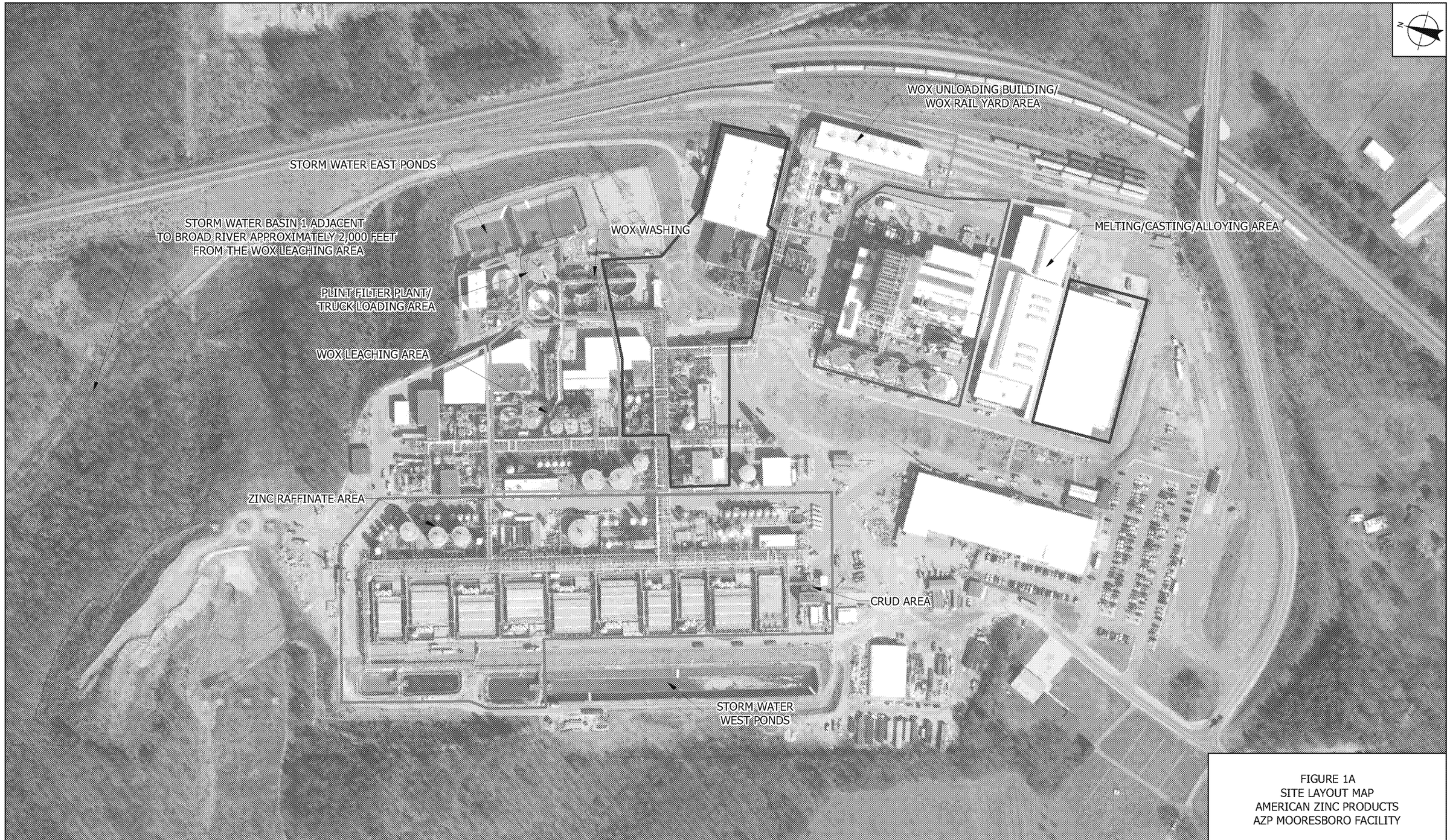

FIGURE 1A
SITE LAYOUT MAP
AMERICAN ZINC PRODUCTS
AZP MOORESBORO FACILITY

LEGEND

- AREA 100 - LEACHING
- AREA 200 - SX (SOLVENT EXTRACTION)
- AREA 300 - BLEED TREATMENT
- AREA 400 - ELECTROWINNING
- AREA 500/900 - CASTING
- AREA 600 - PLINT
- AREA 700 - WOX UNLOADING
- AREA 1100 - WAREHOUSE
- WOX WASHING

NAD 1983 STATE PLANE
NORTH CAROLINA FEET

0 100 200

SCALE IN FEET

REQUESTED BY:	BC
DRAWN BY:	RK
DATE:	8/9/2021
PROJECT:	0888824799

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FIGURE 2
RAFFINATE POND INVESTIGATION
HISTORICAL BORING LOCATIONS MAP
AMERICAN ZINC PRODUCTS
484 HICKS GROVE ROAD
MOORESBORO, NC 28114

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PROJECT:	0888824799

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Source: Google Earth Pro Imagery - 01/28/2021

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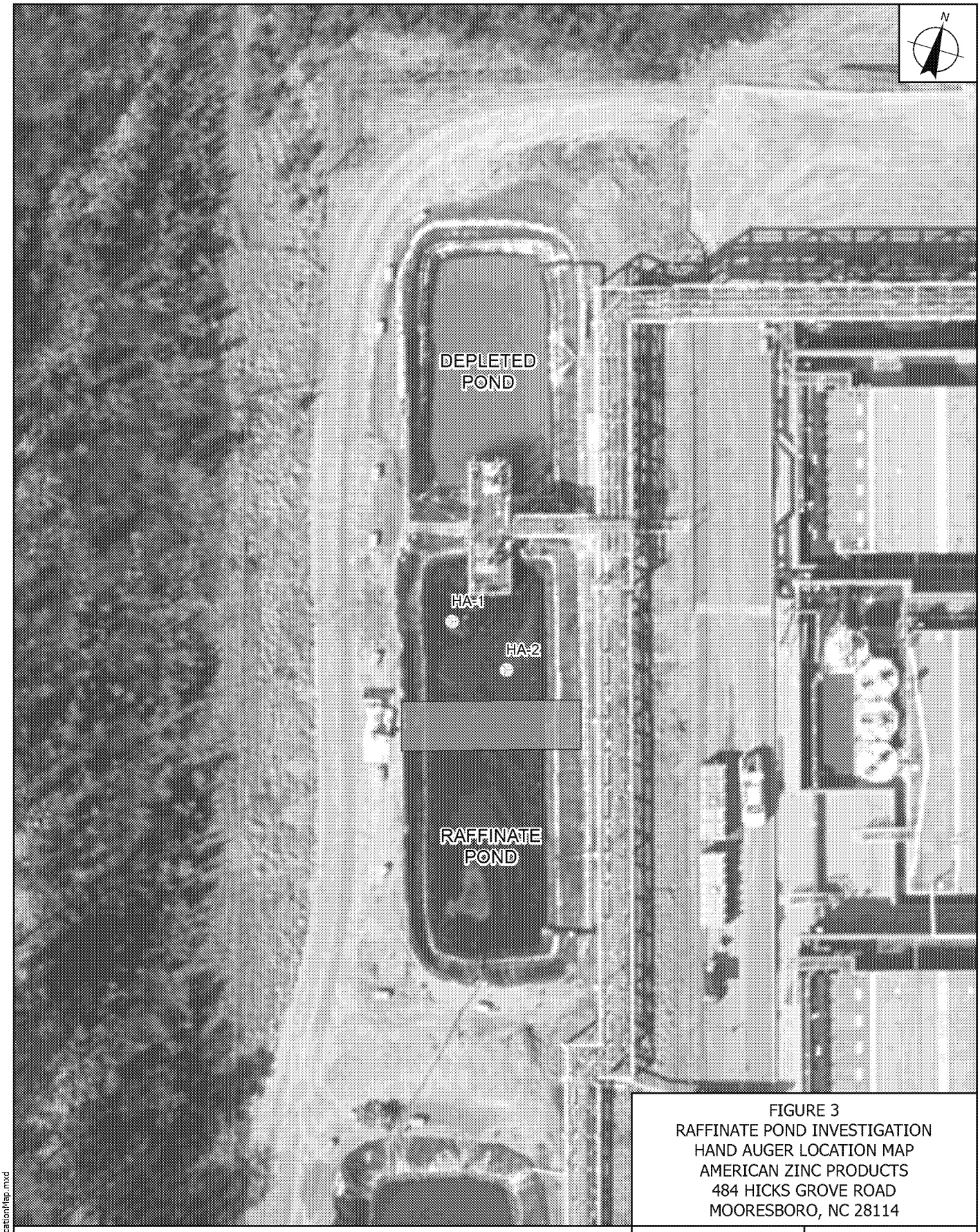

FIGURE 3
RAFFINATE POND INVESTIGATION
HAND AUGER LOCATION MAP
AMERICAN ZINC PRODUCTS
484 HICKS GROVE ROAD
MOORESBORO, NC 28114

LEGEND
HAND AUGER LOCATION
BERM

NAD 1983 STATE PLANE
NORTH CAROLINA FEET
0 20 40
SCALE IN FEET

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DATE:	8/9/2021
PROJECT:	0888824799

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Imagery date - 02/01/2019.

FIGURE 4
AZP POND INVESTIGATION
PROPOSED HAND AUGER LOCATION MAP
AMERICAN ZINC PRODUCTS
484 HICKS GROVE ROAD
MOORESBORO, NC 28114

LEGEND
- PROPOSED HAND AUGER LOCATION
- BERM

NAD 1983 STATE PLANE
NORTH CAROLINA FEET

0 25 50
SCALE IN FEET

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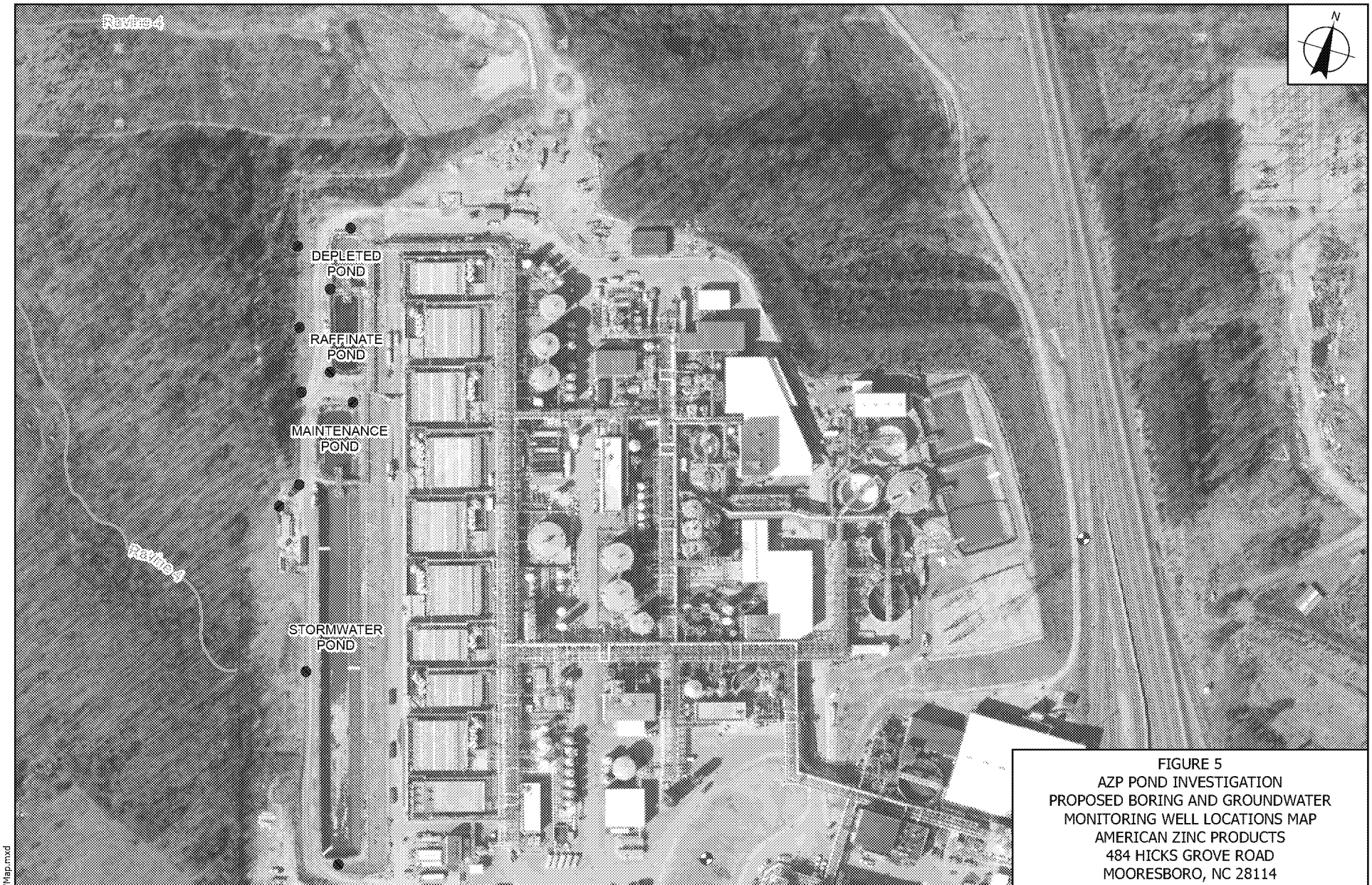

FIGURE 5
AZP POND INVESTIGATION
PROPOSED BORING AND GROUNDWATER MONITORING WELL LOCATIONS MAP
AMERICAN ZINC PRODUCTS
484 HICKS GROVE ROAD
MOORESBORO, NC 28114

LEGEND

- PROPOSED GROUNDWATER WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- RAVINE

NAD 1983 STATE PLANE TENNESSEE FEET

0 110 220

SCALE IN FEET

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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FIGURE 6
SCHEMATIC OF AREA HYDROLOGY
AMERICAN ZINC PRODUCTS
MOORESBORO, NORTH CAROLINA

LEGEND

- SURFACE SEDIMENT/WATER SAMPLE LOCATION
- APPROXIMATE SUBJECT PROPERTY BOUNDARY
- SURFACE WATER DRAINAGE PATHWAY

NAD 1983 STATE PLANE
NORTH CAROLINA FEET

0 200 400

SCALE IN FEET

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Source: Google Earth Pro Imagery Date: 06/03/2018

Attachment
Table 1 – Background Soil Sample Summary

Table 1
Background Soil Sample Summary
Horsehead Metal Products, Inc.
Mooresboro, North Carolina

Sample Location:		SB-27	SB-28	SB-28	SB-29	SB-30
Sample Date:		05/08/2015	05/08/2015	05/08/2015	05/08/2015	05/08/2015
Sample Type:		B	FD	B	B	B
Matrix:		Soil	Soil	Soil	Soil	Soil
Sample Depth (inches bgs):		0 - 6	0 - 6	0 - 6	0 - 6	0 - 6
Analyte	**Units**					
Aluminum	mg/kg	21000	22000	22000	20000	21000
Antimony	mg/kg	ND	ND	ND	ND	ND
Arsenic	mg/kg	2.6	4	3.3	2.3	3.7
Barium	mg/kg	110	51	52	74	37
Beryllium	mg/kg	0.59	0.54	0.48	0.6	0.39
Cadmium	mg/kg	ND	ND	ND	ND	ND
Calcium	mg/kg	160 J	68 J	68 J	180 J	60 J
Chromium, Total	mg/kg	11	87 J	26 J	7.8	22
Cobalt	mg/kg	3.1	8.6 J	8.8 J	2.2	8.8
Copper	mg/kg	6.2	26	23	3.5	17
Iron	mg/kg	9500	43000 J	22000 J	8400	26000
Lead	mg/kg	15	17	15	13	18
Magnesium	mg/kg	580	1700	1800	510	360
Manganese	mg/kg	200	95	84	140	120
Nickel	mg/kg	5.1	10 J	9.2	3.7	12
Potassium	mg/kg	1800	2600	2400	570	720
Selenium	mg/kg	0.86 J	1.5	1 J	0.63 J	1 J
Silver	mg/kg	ND	ND	ND	ND	ND
Sodium	mg/kg	ND	ND	ND	ND	ND
Thallium	mg/kg	ND	ND	ND	ND	ND
Vanadium	mg/kg	18	66	45	15	40
Zinc	mg/kg	24	47	45	22	16
Mercury	mg/kg	0.024 J	0.026 J	0.027 J	0.014 J	0.0069 J

Notes:

B	= background sample
FD	= field duplicate sample
bgs	= below ground surface
mg/kg	= milligrams per kilogram
ND	= analyte not detected above method detection limit
J	= estimated concentration